

**Final Status Survey Protocol
Parcel A Bermed Surface Area
Segregation and Management of Dredged Spoils
Li Tungsten Property
Li Tungsten Superfund Site
Glen Cove, New York
October 4, 2007**

On behalf of TDY Holdings, LLC (TDY), Safety and Ecology Corporation (SEC) has prepared this final status survey protocol to address the final survey of the surface of the Parcel A bermed area after the segregation and removal of the dredged spoils is completed. Some of the Parcel A surface may be cleared (final status survey completed) prior to the completion of segregation activities to provide released space for the temporary storage of below acceptance criteria spoils. Any such areas will be cleared of impacted spoils prior to final status survey and after final status survey will be controlled as a released area. Note: The original health physics support subcontracted by URS Corp for this project was provided by Civil and Environmental Consultants, Inc. (CEC). Effective September 1, 2007 the URS Corp subcontract agreement with CEC was transferred to SEC at the same time as the health physics practice and personnel were transferred from CEC to SEC.

The Li Tungsten Superfund Site is located in the City of Glen Cove, Nassau County, New York, and includes the former Li Tungsten Corporation facility at Herhill Road and Dickson Lane. As a result of processing of ores at the facility on the Li Tungsten property, and the subsequent disposal of portions of the byproducts of that processing, elevated levels of radiation and certain metals have come to be present at or in the vicinity of the Li Tungsten property. The property is approximately 26 acres.

Based upon an evaluation of the various alternatives, EPA and the State of New York selected remedial dredging for the contaminated materials remaining in Glen Cove Creek. The selected remedy includes dredging of those portions of the Creek's navigational channel which fall within the project area to the maintenance depth of eight feet below mean low water, with two feet allowable overdepth, followed by dredging radionuclide

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hot spots in the project area which are detected beyond the USACE's maintenance specification for the channel, followed by segregation and off-site disposal of radioactive material from the dewatered dredged sediments (2005 ROD).

After the completion of the segregation and disposal of the dredged spoils, the remaining surface of the Parcel A Bermed Area (the area) will be surveyed for unrestricted release. The area includes a relatively flat concrete surface surrounded by a soil berm constructed to contain dredge spoils. In addition an internal soil berm divides the area into two cells one of which is completely lined with a synthetic liner. The other cell is partially lined. Both cells were loaded with approximately 30,000 cubic yards of dredged spoils (total) impacted with discrete pieces of hard metallic, radioactive ore/slag. The area surface remaining after the dredge spoils have been segregated and removed consists of approximately 12,000 square meters of concrete surface outlined and bisected with an approximate 1 meter wide soil berm.

The final status surface survey protocol has been designed to address the release of both the concrete surface and the soil berms after contact or potential contact with hard pieces of radioactive metallic ore/slag within dredged spoils. For most indoor structural surfaces, including smooth concrete, a final status surface consists of scanning the surface for total alpha and total beta contamination followed by a series of systematic fixed point measurements of total alpha and total beta contamination and smear samples at the same location for the determination of removable alpha and removable beta contamination. Indoor structures are mostly smooth impervious surfaces prone to surface contamination when exposed to loose radioactive material. However, this is not the case for the outdoor concrete structural surface of the area. Outdoor concrete is often weathered and damp and cannot be readily surveyed for total alpha and beta contamination. Fortunately, the radioactive material placed on the concrete surface consists of Th-232 and Ra-226 and their natural decay series progeny, which emit significant and easily detectable gamma rays. In addition, the physical nature of the radioactive material (hard metallic ore/slag) does not readily spread and attach to concrete surfaces resulting in total and removable surface contamination. Therefore the following final status survey protocol is based on

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the easy detection of any remaining radioactive ore/slag by gamma scan and not total alpha and beta surface contamination. The protocol is based on the guidance of NUREG-1575, EPA 402-R-97-016, Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM):

NOTE: The liner will be addressed after the spoils have been removed and before the final status survey of the remaining Parcel A surface. If the liner is in relatively good physical condition to permit survey for unrestricted release, the liner will be surveyed using the protocol and acceptance criteria for releasing equipment from the site. If the physical condition of the liner does not permit survey for unrestricted release (as a structure or piece of equipment), for example the liner is shredded and in pieces along with remaining spoils, the liner will be processed along with remaining spoils. Parts of the liner may be released as equipment and parts may be handled as comingled spoils.

- (1) Standing water remaining on the surface will be removed prior to the start of the final survey.
- (2) The concrete surface within the berm will be separated into approximately 6 equal size, Class 1 survey units of approximately 2,000 square meters.
- (3) Ambient background in gross counts per minute (cpm), as measured with a standard 2-inch-by-2-inch sodium iodide (NaI) detector equipped with field survey meters, will be determined in the area of the survey.
- (4) The gross gamma scan Minimum Detectable Concentration (MDC) in picocuries per gram (pCi/g) for both Radium-226, and Thorium-232 will be calculated based on the gross cpm background measured. The calculation will be made using the formulas provided in Chapter 6 of MARSSIM.
- (5) The survey area will be surveyed at 100-percent surface coverage with the field survey meters. The meters can survey to a depth of approximately 6 inches. In this manner, any remaining discrete pieces of radioactive material, or accumulations of material, that exceed 5 pCi/g above the natural background will be identified and removed. The material will be staged for disposal along with the above-action-level material accumulated during the segregation of dredged spoils.
- (6) The gross gamma survey instruments will be coupled to a Global Positioning System (GPS) unit and a data logger for performance of the final 100% coverage scan. The resulting GPS coordinates and gross gamma results (cpm) will then be downloaded and plotted to evaluate

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the relative uniformity of the surface area radioactivity and identify any elevated areas. Some areas may be cleared by 100% gross gamma scan without the coupled GPS data if the GPS system is unavailable. A survey map will be prepared of these areas to reflect the area surveyed and the as left gross gamma count rates measured.

- (7) The minimum number of samples required to evaluate the remaining material in the survey area will be calculated based on the scan MDC, using MARSSIM guidance. The minimum number of samples will be based on a 0.05 target value for alpha and beta errors, the 5-pCi/g performance standard, and the anticipated standard deviation of the samples approaching background activity concentrations of Radium-226/228 and Thorium-230/232. This minimum number of samples will be taken if the scan MDC of the survey meter, based on background, is less than or equal to the performance standard. If the scan MDC exceeds the performance standard, the minimum number of samples will increase. The increased number of samples will be calculated based on elevated measurement comparisons and area factors as detailed in MARSSIM. The required number of surface samples of any remaining material will then be obtained using a random-start systematic triangular grid.
- (8) If there is any residual spoils on the concrete surface, the material will be used to fill sample containers. Likewise the berms will be soil sampled at equal distant sample locations. Otherwise, a smear sample for the determination of removable alpha and removable beta surface contamination will be taken at each equal-distant sample point.
- (9) Any spoils samples will then be screened on site with a standard 2-inch-by-2-inch NaI detector coupled to a scaler instrument and mounted in a cave for shielding. The grab sample yielding the highest screening result from each survey unit if there are more than 5 per survey unit or from the entire survey if there are 9 or less total, will be sent to Pace Labs for confirmatory gamma spectroscopy analysis. The results will be compared to the 5 pCi/g above background for both Th-232 + Th-230 and Ra-226 + Ra-228 standard for the site.
- (10) The smear samples will be counted onsite for removable alpha and removable beta contamination. Five percent of the smear samples taken will be forwarded to Pace Labs for a duplicate analysis of removable alpha and removable beta contamination. The results of the smear samples will be compared to the removable contamination standard for the site of 20 dpm/100cm² alpha and 200 dpm/100cm² beta (based on the most restrictive removable contamination limits presented in FC 83-23, Guidelines for Decontamination of Facilities and

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Equipment Prior to Release for Unrestricted Use or Termination of Licenses for Byproduct, Source or Special Nuclear Material, USNRC 1993).

- (11) The soil berm will be surveyed as one Class 1 survey unit of approximately 2,000 m². The soil surface will be surveyed for gross gamma activity at 100% coverage and the requisite number of samples taken at equal distant locations. The samples will be screened on site with a standard 2-inch-by-2-inch NaI detector coupled to a scaler instrument and mounted in a cave for shielding. The sample yielding the highest screening result will be sent to Pace Labs for confirmatory gamma spectroscopy analysis. The results will be compared to the 5 pCi/g above background for both Th-232 + Th-230 and Ra-226 + Ra-228 standard for the site.

The results of all final status survey measurements including instruments, QC measurements and all final status data will be compiled in a summary final status survey report and reviewed by a Certified Health Physicist.